

# **EXHIBIT H**

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## Is Chapter 11 costly?

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### Abstract

We examine a sample of 459 firms filing for Chapter 11 during the period 1991 to 1998 and find that our sample firms experience significant improvements in their operating performance during Chapter 11. Our evidence is consistent with the hypothesis that Chapter 11, if anything, provides net benefits to bankrupt firms. In the cross section, firms with higher debt ratios experience greater improvements in operating performance, and the complexity of the renegotiation process negatively affects the improvement. We find no relationship between Chapter 11 outcome and changes in risk-adjusted firm value in Chapter 11.

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## I. Introduction

Legal scholars and financial economists have raised serious doubts as to the efficiency of the Chapter 11 bankruptcy process. Some researchers emphasize the costs associated with Chapter 11 (see Bebchuk, 1988, 2000, Giammarino, 1989, Jensen, 1991, Gertner and Scharfstein, 1991, Bradley and Rosenzweig, 1992, Pomykala, 2000, and Hart, 2000), while others point out the potential benefits associated with this process (see Gilson, John, and Lang, 1990, Wruck, 1990, Harris and Raviv, 1990, Baird, 1991, Mooradian, 1994, Kalay and Zender, 1997, and Berkovitch and Israel, 1998). The different predictions of these authors can be resolved by empirical documentation of the net costs and benefits of Chapter 11.

Bankruptcy costs are broadly divided into direct and indirect costs. The direct costs are the out-of-pocket expenses related to the bankruptcy proceedings and include filing, legal, and professional fees. The indirect costs are the costs resulting from lost profits of sales forgone, the costs of asset sales at prices below best use value, and the costs of distortions to a bankrupt firm's investment and financing policies resulting from the bankruptcy process.

The direct bankruptcy costs are typically available in the financial statements filed by firms or in court documents and have been shown to be relatively small--about 3% of the market value of the pre-filing assets for large firms (see Warner, 1977, Weiss, 1990, and Tashjian, Lease, and McConnell, 1996). However, the magnitude and significance of indirect costs arising from the bankruptcy process remains unresolved in academic debate. Maksimovic and Phillips (1998) examine plant productivity of firms during Chapter 11 and find no evidence of reduced efficiency of operation. Carapeto (1998), Elayan and Meyer (2001), and Dahiya, John, Puri, and Ramirez (2003) find evidence indicating that debtor-in-possession (DIP) financing available only during Chapter 11 provides benefits to the bankrupt firm. Gilson (1997) finds that Chapter 11 increases

firms' ability to adjust their capital structure. However, Pulvino (1999) examines a specific component of indirect bankruptcy costs, asset fire sales, and finds that airlines operating in Chapter 11 (and Chapter 7) sell aircraft at a discount that averages between 14% and 46%. Kaplan (1994) studies Campeau's acquisition of Federated Stores and finds the estimated post-bankruptcy value of Federated to be about 7.5% lower than what it would have been absent the filing for Chapter 11. Weiss and Wruck (1998) show that during the bankruptcy process the value of Eastern Airline fell by more than 50%.

We construct a sample of 459 firms that filed for Chapter 11 relatively uniformly over a period of eight years. Our sample firms are distributed fairly evenly over a large number of industry segments. We follow the sample firms from 11 fiscal years prior to filing for Chapter 11 through the Chapter 11 period. At the beginning of the period of analysis, 11 fiscal years (year -10) before the filing, our sample firms are similar to the median firms in their respective industries in leverage and likelihood of bankruptcy. At year -10, the sample firms have assets and sales greater than the median firm in their respective industries. However, as the firms approach bankruptcy, the sample firms become significantly more leveraged than the median firm in the industry and reduce in size. Once in Chapter 11, the sample firms are reorganized, liquidated, or acquired.

Our estimates of net indirect bankruptcy costs are based on changes in operating income over the bankruptcy period. We define operating income as earnings before interest, taxes, depreciation, and amortization (EBITDA) scaled by assets. Indirect bankruptcy costs are estimated by measuring changes in the firm's industry-adjusted and normalized operating income and by changes in the firm's income relative to an industry- and performance-matched sample.

Our main results are presented graphically in Fig. 1, which plots operating income for our sample firms that reorganize in Chapter 11 from quarter -32, eight years before the Chapter 11

filing (quarter 0 is the fiscal quarter that ends before the Chapter 11 filing), through quarter 8 post-filing. Consistent with Altman (1984), in Fig. 1, we observe declining operating income for our sample firms from about 16 quarters before filing. The operating income exhibits a sharp decline as the sample firms approach Chapter 11 filing. This decline in performance is not, by itself, evidence of bankruptcy costs; firms that file for bankruptcy do so presumably because they performed poorly prior to that event. To obtain an unbiased measurement of bankruptcy costs, the critical period of investigation is the bankruptcy period itself. If bankruptcy is costly, we should observe inferior performance of bankrupt firms. However, we find that the decline in operating income is arrested at quarter +1, the fiscal quarter immediately following the Chapter 11 filing. (Quarter +1 contains income from the pre-filing period, hence the continued negative performance.) Subsequent to quarter +1, the operating income for our sample firms show significant increases. We also find qualitatively similar patterns for industry median adjusted and industry median adjusted and normalized operating income. This evidence is consistent with the hypothesis that Chapter 11 provides net benefits to firms.

[Insert Fig. 1 near here]

In addition, we examine the sources of the improvements in operating performance during bankruptcy. Over the Chapter 11 period, our firms shed assets and employees and show improvements both in gross margins and in operating margins. To explore the impact of various factors conjectured to contribute to the costs and benefits of Chapter 11, we regress our measure of operating performance over the Chapter 11 period on a variety of variables. Two variables are significant in our regressions. First, an increase in the number of classes in the plan of reorganization (a proxy for the complexity of the bargaining process) is associated with lower benefits. Second, an increase in the pre-filing debt ratio (total debt to total assets) is positively

related to improvements in operating performance. Presumably, the value of the automatic stay is particularly valuable to those firms.

Because of data limitations, our analysis of changes in operating performance focuses on those firms that reorganized in Chapter 11. Our sample also includes firms that are liquidated, acquired, or merged during the Chapter 11 processes. These firms, however, seldom issue annual financial statements during bankruptcy and so we are unable to examine their operating performance. Those firms that reorganize could suffer from temporary poor performance while firms that liquidate or are acquired could have deeper problems. To investigate the possible selection bias in limiting our analysis to a sample of firms that reorganized in Chapter 11, we examine the behavior of the market value of the firms from the day after they file for Chapter 11 until after they emerge out from Chapter 11 for all firms in our sample, regardless of Chapter 11 outcome. We find an insignificant difference between the market value changes during Chapter 11 for the reorganization subsample and the liquidation and acquisition subsample. Thus our evidence is consistent with the hypothesis that, if anything, firms (including those liquidated or acquired) enjoy net benefits in Chapter 11.

The paper is organized as follows. We describe the data and provide sample descriptive statistics in Section 2. Section 3 presents our results on firm performance during the pre-filing period for all of our sample firms and for the subsample of firms that reorganize. Section 3 also shows the changes in performance during Chapter 11. Section 4 explores the sources of the gains in operating performance shown in Section 3. Section 5 presents evidence indicating that the performance of firms that reorganize in Chapter 11 is not significantly different from the performance of firms that were acquired or liquidated. Section 6 concludes.

## 2. Sample selection and descriptive statistics

Our initial sample includes all firms with at least one publicly traded security that filed for Chapter 11 bankruptcy between January 1991 and December 1998. Specifically, in our initial sample we include firms in the database maintained by New Generation Research ([www.bankruptcydata.com](http://www.bankruptcydata.com)) and firms deleted from the Center for Research in Security Prices (CRSP) and Compustat databases because of bankruptcy.<sup>1</sup> We identify 517 firm observations for our initial sample. Because we use data from Compustat to conduct our analysis, we exclude 37 firms not present in that database from the final sample. Financial firms [Standard Industrial Classification (SIC) codes between 6000 and 6999], partnerships, and real estate investment trusts (REITs) are also excluded from the sample because treatment of those firms differs from other firms in Chapter 11. We also exclude three firms whose cases were dismissed by the bankruptcy court.<sup>2</sup> During our sample period, 15 firms filed for Chapter 11 twice, and one firm filed for Chapter 11 three times. Our final sample consists of 459 bankruptcies.

Table 1 provides information about whether the Chapter 11 filing was debtor- or creditor-initiated (voluntary or involuntary), the yearly distribution of Chapter 11 filing dates, the outcome of the Chapter 11 process for the sample firms, the time spent in Chapter 11, and information about firm size and leverage in the 11 years preceding the Chapter 11 filing. Panel A shows that most of our sample firms (436) file Chapter 11 voluntarily. Of these, 371 firms filed traditional Chapter 11 and 65 firms filed prepackaged Chapter 11. The remaining 23 firms were subject to involuntary

<sup>1</sup> The website [bankruptcydata.com](http://bankruptcydata.com) includes all firms with at least one public security and at least \$50 million in assets that filed for Chapter 11.

<sup>2</sup> In one case, the court dismissed the bankruptcy filing at the request of the company. One firm was liquidated, and another was acquired and the court dismissed the Chapter 11. Because the tax consequences of these transactions could differ from the tax consequences of similar transactions occurring in Chapter 11, we exclude these firms from our sample.



bankruptcy petitions filed by creditors. Eighteen of these cases were involuntary Chapter 11 filings and the firms consented to convert them to voluntary Chapter 11. In three firms, creditors filed involuntary Chapter 7 petitions that were converted into Chapter 11 cases at the firm's request. The remaining two involuntary Chapter 7 filings were converted to prepackaged Chapter 11. We treat the voluntary Chapter 11 or involuntary Chapter 11 or Chapter 7 filing date as the start of the Chapter 11 process. Panel B provides information about the yearly distribution of Chapter 11 filing dates. The number of firms filing in a particular year is relatively evenly distributed across our sample period.

[Insert Table 1 near here]

We assign firms in our sample to five distinct categories on the basis of the outcome of the Chapter 11 processes. We categorize a firm as a reorganization if we have evidence that the firm reorganized and emerged from Chapter 11, as a liquidation if the firm's assets are sold to more than one buyer, as an acquisition or merger if either substantially all of the firm's assets are acquired by one buyer or if the firm merged with another firm, as still in Chapter 11 if the firm continues in Chapter 11, or as an undetermined outcome if we are unable to obtain information about the outcome. We searched the news and Securities and Exchange Commission filing section of the Lexis/Nexis archives for any article or financial statement on each of these firms, but we could not gather any information about the outcome. Panel C shows that about 44% of our sample firms reorganized, 20% liquidated, 15% are acquired or merged, and 20% have undetermined outcomes.<sup>3</sup> The distribution of time spent in Chapter 11, measured as the number of years between the filing date and the confirmation date of the plan, is given in Panel D. Most of our sample firms (about

<sup>3</sup> The distribution of outcomes is similar to that reported in Hotchkiss (1995). In her sample, 24% of the firms emerged as public companies, 18% emerged as private, 15% were liquidated, 7% were merged, and 36% were still in Chapter 11 or unresolved. The liquidations in our sample occurred in Chapter 11 and were not converted to Chapter 7.



95%) spend three years or less in Chapter 11. The average (median) number of months spent in Chapter 11 is 14.7 (12.9) months (Panel E).<sup>4</sup> Average time spent in bankruptcy for different outcomes ranges from 14 months for reorganizations to 18 months for those firms for which we are unable to determine the outcome of the bankruptcy.

The sample firms are distributed across 51 industry segments at the two-digit and 195 industry segments at the four-digit SIC level. At the two-digit SIC level, there is a concentration of sample firms in four industry segments: 37 firms in "industrial and commercial machinery and computer equipment" (SIC code 35), 25 firms in "general merchandise stores" (SIC code 53), 24 firms in "electrical equipment and components" (SIC code 36), and 23 firms in "business services" (SIC code 73). Each of these industry segments either has a large number of firms or was distressed during our sample period. In our cross-sectional tests, we add a dummy variable to control for industry distress.

Panel F provides information on firm characteristics including firm size (measured in sales) and leverage (measured as total debt to total assets) for the sample firms for 11 years preceding the Chapter 11 filing. Column 1 contains the year relative to filing (year 0 is the fiscal year-end preceding the Chapter 11 filing), Columns 2 through 6 provide information about sales, and Columns 7 through 11 contain information about total debt to total assets. For the two characteristics, each row contains the number of firms, the mean and median industry-adjusted characteristic for the sample firms, the *t*-statistic for the test that the industry-adjusted mean is zero, and the *z*-statistic for the sign test for equality of firm and industry median characteristic. We

<sup>4</sup> We were able to obtain exact confirmation dates for only 262 of our sample firms. The average number of months spent in Chapter 11 for our sample firms is less than that reported in other studies. For example, Gilson, John, and Lang (1990) report 20 months, and Weiss (1990) reports 30 months. The primary reason for the difference is that our sample contains significant number of prepackaged Chapter 11s which were resolved in considerably less time than traditional Chapter 11s. Tashjian, Lease, and McConnell (1996) find that firms filing prepackaged Chapter 11 spend an average of three months in Chapter 11.

calculate median industry characteristics by first finding the median of all the firms in the same four-digit SIC code industry segment as our firm, provided there are at least five firms. If there are fewer than five firms at the four-digit level, we attempt to match firms and industries at the three-digit and finally the two-digit level. If any of our sample firms is from an industry segment that has less than five firms at even the 2-digit level, we do not include that firm in our calculations of that particular characteristic. Consistent with Barber and Lyon (B&L, 1996), we omit the sample firms from the industry in our calculations. To compute the industry-adjusted characteristic (sales or debt to assets), we subtract the relevant median industry characteristic from the comparable characteristic for each firm in our sample. (Our calculations eliminate one firm in years -10, -9, and -8 with a debt-to-asset ratio in excess of 50.)

Sample firms are significantly larger, as measured by sales (and total assets, which are not reported in the table), than the industry median 11 years prior to the Chapter 11 filing but, median sales are insignificantly different from the industry median by the end of the fiscal year preceding the Chapter 11 filing. Our median sample firm has leverage (measured by total debt divided by total assets) similar to that of industry median firm at year -10 (11 fiscal years preceding the Chapter 11 filing), but the leverage in the sample firms begins to diverge from the industry median firm in subsequent years. The divergence between the sample firm's leverage and industry median leverage starts early in the sample period, and by year -7 the sample firms are significantly more levered than the industry median. The mean industry-adjusted debt-to-asset ratio is already significantly positive by year -10. Other leverage ratios for the sample firms generally start to worsen each year from about year -6 relative to Chapter 11 filing. (We examined three other measures of leverage: total debt to total capital, total liabilities to total assets, and EBITDA to interest expense. All three measures show patterns similar to those of total debt to total assets.) By

the fiscal year-end prior to filing for Chapter 11, the median sample firm has a total debt to total asset ratio of 0.55, exceeding the industry median ratio by 0.28. Although we do not report the complete results here, a similar pattern emerges in Altman (1968) z-scores for the sample firms. (Altman's z-score is used to predict the likelihood of bankruptcy for manufacturing firms. High values of z-score indicate that bankruptcy is less likely and low values indicate a greater likelihood of bankruptcy.) The z-score for the median sample firms is statistically indistinguishable from the industry median in the years -10 through -8, but it falls below the healthy range in year -7 and is significantly different from the industry median. Not surprisingly, from year -7 onward, we observe a steady decline in the z-scores for the sample firms relative to industry medians until the Chapter 11 filing.

### 3. Operating performance

In this paper, we use EBITDA as our measure of performance of firms in bankruptcy. Direct costs of bankruptcy, such as legal and administrative expenses, generally are identified explicitly in court filings or in a firm's 10-K. Indirect costs cannot be observed directly. Ultimately, however, any indirect costs associated with bankruptcy should be reflected in the cash flows of the firm. EBITDA has been used extensively in prior literature as a proxy for operating cash flows and for the operating performance of a firm (see Kaplan, 1989, Kaplan and Stein, 1993, and Andrade and Kaplan, 1998, among others).

As our proxy for the operating performance of the sample firms, we first divide EBITDA by assets to control for firm size. Then, we adjust each firm's scaled EBITDA by the industry median scaled value, and finally we normalize the industry-adjusted scaled values by the standard deviation of the scaled number within the industry. (We also use the Barber and Lyon, 1996, methodology in

Section 3.2 to ensure that our conclusions are not the result of mean reversion in performance.)

Our measure of standardized and normalized operating income can be written

$$[(EBITDA/assets)_{firm} - (EBITDA/assets)_{industry}] / \sigma [(EBITDA/assets)_{industry}]. \quad (1)$$

### 3.1. Operating income in the pre-filing period

Table 2 provides information about operating cash flows in the pre-filing period.

(Examination of cash flow variables reveals that they are strongly non-normal. Therefore, our statistical analyses are conducted using nonparametric techniques.) The first column of Table 2 contains the year relative to the filing year (year 0). The next three columns, Panel A, contain information for our entire sample, and the remaining panels provide information for four subsamples categorized by Chapter 11 outcome (reorganization, liquidation, acquisition or merger, and undetermined.) For the entire sample, industry-adjusted normalized EBITDA/assets generally is statistically indistinguishable from the industry median in years -10 to -5, but from year -4 to year 0, the sample firms experience declines in the operating cash flows relative to the industry. We obtain qualitatively similar results when we use raw EBITDA to assets, industry-adjusted but not normalized EBITDA to assets, and the various transformations of EBITDA/sales. In addition, in the later part of the pre-filing period, the decline in cash flows is statistically significant from year to year until year 0.

[Insert table 2 near here]

Next, in Panels B through E, we investigate whether firms that ultimately have different outcomes in Chapter 11 experience differences in operating performance in the period leading up to the Chapter 11 filing. All four subsamples suffer declines in operating performance in the period before they file for Chapter 11. By year -3, four fiscal years before filing for bankruptcy, the sample firms in each of the four subamples are significantly underperforming their industry in

terms of EBITDA to assets. At the fiscal year-end preceding the Chapter 11 filing, 90.0% of firms that ultimately liquidate in Chapter 11, 90.4% of firms that are acquired, and 80.9% of firms with undetermined outcomes underperform their industry. Of firms that reorganize 86.6% are underperforming. When we compare the industry-adjusted normalized operating income at the fiscal year-end before the Chapter 11 filing (year 0), there is no statistical difference between the firms that ultimately reorganize and the firms that ultimately are acquired, are liquidated, or for which we could not determine the outcome.

Although EBITDA is a frequently used proxy for operating cash flows of firms, managers of firms have the ability to manipulate EBITDA. Managers of poorly performing firms could have greater incentives to manipulate earnings. For example, tying managerial compensation to accounting profits or trying to present attractive financial statements to enhance the firm's ability to raise funds from external sources could encourage manipulation. Before 1987, US public firms were not required to report a statement of cash flows. Thus cash flow from operations (Compustat data item #308) is available only from 1987 onward. To test the divergence between EBITDA and cash flow from operations, we repeated our analysis using both EBITDA and cash flows from operations for the period after 1987. The results were statistically indistinguishable in all but one of the years. To maximize our sample size, we use EBITDA as our measure of cash flows.

To summarize the results so far, our sample firms suffer declines in operating performance compared with their industry counterparts. The deterioration in operating performance starts long before the firms file for Chapter 11. When we divide our sample by the ultimate outcome of the Chapter 11 process, the evidence indicates that all four subsamples experience relatively poor operating performance prior to filing for Chapter 11. Our results are consistent with Altman (1984), who shows negative performance in the period leading to bankruptcy. Altman uses a

sample of firms that file for Chapter 11 and estimates their indirect cost of bankruptcy at about 30% of pre-filing assets by computing profits lost as a result of forgone sales in the period preceding the bankruptcy filing. However, by constructing a sample conditional on a bad event (a bankruptcy filing) and examining the period prior to that event, it is likely that Altman's measure of indirect costs suffers from selection bias. Wruck (1990, p. 438) points out that Altman's measure "is problematic because it is impossible to tell whether the loss in profits is in fact caused by financial distress or whether financial distress is caused by the loss in profits."

### *3.2. Operating performance of firms during Chapter 11*

If Chapter 11 were costly for firms, we would expect to find continued deterioration in the operating performance of sample firms during the Chapter 11 period. In this section, we study the behavior of the operating performance for the sample firms during the Chapter 11 period. Because of data limitations, the results in this section pertain to the subsample of firms that reorganize and emerge from Chapter 11. In Section 5, we return to the issue of performance during Chapter 11 for all of our subsamples.

We begin by examining changes in our measure of operating performance from Section 3.1, industry-adjusted and normalized EBITDA to assets, from the fiscal year-end preceding bankruptcy to the fiscal year-end following emergence from Chapter 11. We repeat our analysis using the Barber and Lyon (1996) methodology to ensure that our results are not driven by mean reversion in reported accounting earnings. To be included in our analysis, sample firms must report financial data both at the fiscal year-end immediately preceding the Chapter 11 filing (year 0) and at the fiscal year-end immediately following the firms' emergence from Chapter 11 (year post). Table 3 presents information on changes in the operating cash flows during the Chapter 11 period for our subsamples of firms that reorganize. To avoid mixing cash flows from periods in which firms are



operating in Chapter 11 and periods after firms have emerged, we initially divide the sample into three subsamples determined by the length of time firms spend in Chapter 11: up to one fiscal year, between one and two fiscal years, and between two and three fiscal years.

[Insert table 3 near here]

Panel A of Table 3 contains results for changes in industry-adjusted normalized EBITDA to assets during Chapter 11, in which the industry is matched based on four-digit SIC, as in Table 2. The upper part of Panel A contains the results for the subsamples based on time in Chapter 11. For each subsample, the change in operating performance during Chapter 11 is significantly positive. The bottom portion of Panel A contains data for the full sample, regardless of the time spent in Chapter 11. Overall, using changes in industry-adjusted normalized EBITDA to assets, firms experience significant improvements in operating performance from the fiscal year before filing to the fiscal year-end post emergence ( $z$ -statistic sign-rank = 4.87).

The improvements in operating performance shown in Panel A could arise for two different reasons. Perhaps the results are simply as a result of mean reversion of earnings. If earnings follow a stationary process, then unusually low earnings (as observed prior to filing) are expected to be followed by higher earnings. Alternatively, the improvements we find could be the result of real economic changes facilitated by Chapter 11. We investigate this issue by adopting the Barber and Lyon (1996) methodology, which adjusts for mean reversion in accounting earnings.

In Panel B, following Barber and Lyon (1996), we form a control group for each sample firm by identifying all firms that have the same two-digit SIC classification as our sample firm and have performance (measured as EBITDA to total assets) between 90% and 110% of the performance of the sample firm at year 0. At each year inside Chapter 11 and at year post, we adjust the operating performance of each of our sample firms by subtracting the median operating



performance of the control group for that firm from the corresponding operating performance of the sample firm. Thus our measure captures excess operating performance relative to the control sample. In Table 3, Panel B, the column labeled "median excess performance" contains the median of these excess performance values. By construction, the time 0 excess performance measure is close to zero.<sup>5</sup> The column labeled "median change" contains the change in excess operating performance from the fiscal year-end preceding filing to the fiscal year-end following emergence. The last column contains the z-statistic for the sign-rank test for the median change in excess performance from time 0 to post-bankruptcy.

The upper portion of Table 3, Panel B contains the median change in industry- and performance-adjusted EBITDA to assets from the fiscal year preceding filing (year 0) to years 1, 2, and post-emergence for three subsamples based on the length of time in Chapter 11. The median industry- and performance-adjusted EBITDA to assets post-reorganization exceeds the time 0 value of this measure for each subsample but, given the relatively small sample sizes (35, 44, and 23 firms), the improvements are not statistically significant at the 5% level. In the lower portion of Table 3, Panel B, when we combine all the firms together, with the larger sample size, the change is significantly positive (z-statistic = 2.19). Overall, our results indicate that these firms experience improvements in performance relative to the control sample during Chapter 11.

### 3.3. *Additional robustness checks*

In choosing our sample matching date, we follow Barber and Lyon (1996) and Maksimovic and Phillips (1998) and form our sample match at the fiscal year-end preceding the event (the

<sup>5</sup> When computing the excess performance at time 1 (or time 2 or time post), we require that firms in the control group are present in both years 0 and 1 (2, post). If a control group firm is present in year 0 but not in year 1 (2, post), we drop that firm from the control group. If we cannot find a match for our sample firm using two-digit SIC code and the performance filter, we attempt to find a match without regard to the SIC code by matching firms using only the performance filter. We drop the firm from our sample if we cannot find a match for that firm using only the performance filter.

Chapter 11 filing) and define the bankruptcy period from the fiscal year-end prior to filing to the fiscal year-end post-emergence. While the traditional Barber and Lyon (1996) methodology generally is believed to control adequately for statistical mean reversion in operating performance, the issue could merit further exploration given that our sample of bankrupt firms experiences several years of poor performance prior to filing (see Table 1). Consequently, our firms could exhibit a larger increase in earnings following filing than would a sample of firms with a history of one bad year of earnings.<sup>6</sup> To obtain a clearer picture, we disaggregate the Barber and Lyon control sample and our sample of bankrupt firms and examine the behavior of these two samples in event time. The results are presented in Fig. 2. We begin with the 113 firms that ultimately reorganize for which we have data for the first fiscal year post-Chapter 11 (this is the data from Panel B of Table 3). We compute the median EBITDA/assets (E/A) for sample firms and plot that at time 0, the date at which our Barber and Lyon match is constructed. Following the B&L procedure, we take all the candidate matches for a given sample firm and find the median E/A for those matches. That becomes one observation for the matching sample. Then, we find the median of the matches across the whole control sample for year 0 and plot the result. We use the same procedure working back through time to ten years prior to year 0. As we do so, both sample firms and match firms drop out. As long as we have the sample firm and at least one match, we use the data. At time 0, we have 113 data points; by year -10, we have 51 data points from which we find the median E/A to plot. As we move forward from year 0, firms remain in our sample through the first fiscal year post-emergence.<sup>7</sup> At time +1, we have 110 data points; by year +3, there are 32 data points; and by year +6, there are only six data points.

<sup>6</sup> We thank the referee for pointing this out.

<sup>7</sup> Some firms report data at time 0 and for the first fiscal year post emergence, but not for each fiscal year inside Chapter 11. So, data for those firms are missing from the figure for years between 0 and post. Furthermore, the number of firms at each data point in the picture drops from year to year after the Chapter 11 filing as firms emerge

[Insert figure 2 near here]

Fig. 2 indicates that both control firms and sample firms have significantly declining performance leading up to time 0 (the slope coefficient for a regression line for the 11 years from -10 to 0 is significantly negative at the 1% level for both the sample and control firms). Thus both our control and sample firms are performing poorly at time 0 and have experienced declining performance for a number of years leading up to the sample formation date. Despite the generally downward drift in E/A in the years leading up to the sample formation date, there are reversals in the plot both for sample firms and for control firms. However, the behavior of sample firms and control firms is different between year 0, the sample matching date, and year +1. Control firms exhibit a big bounce up in E/A after the poor performance of the previous few years (the mean reversion behavior shown by many authors, including Barber and Lyon), while our sample firms experience substantial declines. The pattern in Fig. 2 is consistent with our concern that the operating performance between the fiscal year-end before filing (year 0) and the fiscal year-end after filing (year 1) contains pre-filing negative performance of our sample of bankrupt firms.

To pinpoint the behavior of earnings during this year more precisely, we extend our analysis to quarterly data. Fig. 3 plots data for the firms from Fig. 2 for which we have quarterly data. Fig. 3 shows that the operating performance of sample firms falls from quarter 0 to quarter 1, the quarter that contains earnings both in and out of bankruptcy but begins to rise from quarter 1 to quarter 2, the first quarter with earnings only inside Chapter 11. Thus the negative performance from the fiscal year-end preceding bankruptcy to the fiscal year-end following the Chapter 11 filing shown in Fig. 1 appears to be associated with declines in the pre-bankruptcy period.

[Insert figure 3 near here]

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from Chapter 11. Therefore, one cannot visually average the points on the graph to recreate perfectly the more complete numerical tests reported in Table 3, Panel B.

Figs. 2 and 3 suggest that the poor performance of financially distressed firms in the last weeks or months before filing for Chapter 11 could produce downward biased estimates of the changes in operating performance during Chapter 11. Therefore, we use quarterly data to construct two additional versions of the test of changes in adjusted operating performance for firms that reorganize in Chapter 11. First, we form our Barber and Lyon match at the quarter before the filing date (quarter 0) and compute the change in adjusted operating performance from that date to the first quarter post resolution that matches the calendar quarter for the sample formation date. (We match the calendar quarter post-Chapter 11 to the calendar quarter when the match is formed because quarterly data often have significant seasonality.) Second, we look at changes in adjusted operating performance by forming our match at the quarter following the bankruptcy filing date, quarter 1. We also compute the Barber and Lyon adjusted changes in operating performance using annual data and forming the match at the fiscal year-end following the Chapter 11 filing. Unfortunately, this procedure causes us to lose the 30% of our sample firms (34 of 113) that file and emerge from bankruptcy within the same fiscal year. Each of these tests results in a different sample of matching firms.

Panel C of Table 3 presents results for changes in operating performance for quarterly data with the sample match formed the quarter before filing (quarter 0), for quarterly data with the sample match formed the quarter after filing (quarter 1), and for the annual data with the sample match formed at the fiscal year-end after filing (year 1) for those firms with at least one fiscal year-end inside Chapter 11. For all three tests, the median adjusted performance improvement is significantly positive. The median excess quarterly earnings from quarter 0 to post-emergence are 0.005, which is comparable to the annual excess earnings of 0.018 from year 0 to post-emergence.

Median excess earnings for the Chapter 11 period for the two samples formed post-filing are much larger: 0.011 for the quarterly change and 0.037 for the annual change.<sup>8</sup>

In Section 4, we explore whether bankrupt firms appear to be making changes that might result in real performance improvements and whether we can explain the performance improvements in the cross section using proxies for the costs and benefits associated with Chapter 11. In further analysis, we focus on the excess performance measure from Panel B in which the control sample is matched at time 0 and the financial data are annual.<sup>9</sup>

#### 4. Sources of gains during Chapter 11

The results presented in Section 3 indicate that our sample of reorganizing firms shows significant improvement in operating performance inside Chapter 11. These results are consistent with Maksimovic and Phillips (1998), who do not find any evidence of indirect bankruptcy costs for firms in declining industries. In Section 4.1, we explore the source of improvements in operating performance shown in Section 3. Section 4.2 explores how various components of costs and benefits of Chapter 11 affect the improvement in the cross section.

##### 4.1. Sources of gains in operating performance

<sup>8</sup> As a final check on whether the improvement in operating performance is the result of mean reversion, we extend the B&L methodology and match our sample of bankrupt firms on two-digit SIC and two years of annual performance, instead of the customary single year of operating performance. To avoid mixing the pre-filing period performance with the performance during bankruptcy, we match at time 0 and time 1; the sample size drops to 30 firms and the median excess operating performance is still significantly positive (the z-statistic for the sign-rank test is 2.05). We cannot match on more than two years of operating performance as the number of firms with matches becomes too small to conduct meaningful statistical tests.

<sup>9</sup> Although the estimate of improved performance could be biased downward by forming our match at time 0, if we form the match at time 1, we lose about a third of the sample systematically from among those firms that enter and emerge from Chapter 11 within a single fiscal year. We also lose about a third of the firms if we use quarterly data and introduce a significant amount of noise because of the volatility and seasonality associated with quarterly accounting numbers.

We begin by examining the components of EBITDA, our measure of operating income, to ascertain whether improvements can be attributed to improved sales, reduced costs, or overall improved margins. For each variable we examine, we take the variable at the fiscal year-end following emergence from Chapter 11 and divide its value by total assets at that date. From that ratio, we subtract the comparable ratio from the fiscal year-end immediately prior to the Chapter 11 filing. Panel A of Table 4 reports the changes in these ratios. Adjusting for industry does not affect our conclusions. EBITDA to total assets rises significantly over the Chapter 11 period (a mean change of 0.07 with a  $t$ -statistic = 2.40; the median change is 0.03 with a  $z$ -statistic for the sign-rank test of 3.93). Both sales to total assets and cost of goods sold to total assets rise by statistically insignificant amounts over the Chapter 11 period. The selling, general, and administrative expense (SG&A) change has a negative mean and a positive median over the Chapter 11 period. Unfortunately, because of data limitations, we were able to calculate changes in labor costs to total assets for only seven firms. However, these firms experienced a sharp drop in labor cost of about 10% from filing to emergence ( $t = -2.49$ ;  $z = -2.10$ ).

[Insert Table 5 near here]

Wruck (1990) conjectures that Chapter 11 could facilitate a beneficial strategic realignment of firms reorganizing in Chapter 11. John, Lang, and Netter (1992) examine a variety of measures of focus when large firms voluntarily restructure and find that these firms reduce labor, increase focus, and cut costs. Following John, Lang, and Netter, Panel B of Table 4 contains percentage changes in assets, sales, and the number of employees for our firms over the Chapter 11 period. On average, assets decline by 21%, sales decline by 14%, and the number of employees declines by 23% during Chapter 11 (all statistically significant). We also examine the number of business



segments, which decline by an insignificant amount.<sup>10</sup> These results lend support to the conjecture that Chapter 11 is associated with a reduced scale of operation and an increase in the focus of firms' investment policy, which could in turn explain the gains in operating efficiency.

#### *4.2. Cross-sectional determinants of improvements in operating performance*

Our results suggest that, on average, firms that reorganize experience net benefits in Chapter 11. In this section, we explore whether some of the costs and benefits identified in prior literature can help explain our results in the cross section. Specifically, we regress excess changes in the Barber and Lyon operating earnings (Panel B, Table 3) on a variety of proxies for specific costs and benefits of Chapter 11. Because of data limitations, these tests are conducted for only the sample of firms that reorganize.

Cross-sectional differences in costs in Chapter 11 have been linked to various measures of the complexity of the negotiation process. Examples of proxies used in prior work include size (Weiss, 1990), length of the bankruptcy process (Gilson, John, and Lang, 1990), and number of debt classes identified by Moody's (Gilson, John, and Lang). We use a different measure to capture bargaining complexity, the number of classes in the plan of reorganization. Under the Bankruptcy Code, the plan of reorganization must group claimholders into substantially similar classes. Votes for and against the plan are tabulated by class (for a consensual bankruptcy, half in number and two-thirds by amount of those who vote must favor the plan in each class) and all claimholders in a given class must receive identical treatment under the plan. Given the important role of classes in Chapter 11, we believe that this variable serves as an excellent proxy for the

<sup>10</sup> If we compute changes in operating income in Table 4 from the fiscal year-end post-filing to the fiscal year post-emergence, the sample of firms for which we have data decreases from 113 to 71 firms. The mean improvement in EBITDA/assets is 8.0% ( $t$ -statistic = 4.30); other components of operating income (Panel A of Table 4) are insignificantly different from zero. Reductions in size from time 1 to post are similar in magnitude, sign, and significance to those reported in Panel B for sales, employees, and business segments; the change in assets from time 1 to post is about half that from time 0 to post (reduction of 10%,  $t$ -statistic = 2.16).



complexity of the negotiation process. Specifically, our measure of complexity is the number of classes identified in the plan excluding administrative, tax, priority, and inter-company classes (which are numbered in some plans and not in others).<sup>11</sup>

Wruck (1990) identifies a number of possible benefits to Chapter 11 including access to debtor-in-possession financing and managerial or governance changes. We use a dummy variable to capture whether a firm uses DIP financing and another dummy variable to capture whether there is a change in the chairman of the board, chief executive officer, or president (Gilson, 1989) from the fiscal year-end prior to filing to the first fiscal year-end post-reorganization.

A firm's ability to stay payments to its creditors is another important feature of Chapter 11. During Chapter 11, firms do not make payments to creditors (with the exception of trade creditors, which are typically paid "in the ordinary course of business") and interest no longer accrues on unsecured or under secured debt. The larger the debt burden of the firm, the more beneficial is this feature of Chapter 11, all else constant. We measure the debt burden as total liabilities divided by total assets at the fiscal year-end prior to filing.

Finally, we include several control variables. We include a prepack dummy as there is some evidence that prepacks could differ systematically from traditional Chapter 11s (Tashjian, Lease, and McConnell, 1996). We use the market-to-book ratio as a proxy for Tobin's Q (Gilson, John, and Lang conjecture that Q captures the benefit of restructuring a firm with significant going concern value) and Altman's z-score as a proxy for degree of financial distress.<sup>12</sup> Finally, we include a dummy variable if a firm is in a distressed industry.<sup>13</sup>

<sup>11</sup> We used a variety of other measures to capture complexity, including size, trade credit, and length of Chapter 11. When the number of classes is included in the regressions, none of these entered the regressions significantly and several of them resulted in substantially smaller sample size. For brevity, we omit them from our tables. Results are available from the authors upon request. Specifically, we measured size as the natural log of sales (we standardize earnings by assets), we measure trade credit as the ratio of allowed general unsecured claims to total claims, and for the length of Chapter 11, we used the number of months from filing until resolution.

The first regression in Table 5 contains the control variables, none of which is statistically significant. In the second regression, we drop the market-to-book ratio and Altman's z-score. The remaining parameter estimates are virtually unchanged, but our sample size rises from 68 to 86 and the fit of the model improves. As might be expected, the complexity of the bankruptcy, as measured by classes, has a significantly negative impact ( $t = -2.83$ ) on improvements in operating cash flows. Bankruptcy processes with more classes of claimholders are more costly. Of the variables we use to capture benefits, only the debt level, measured as total liabilities to total assets prior to filing, is statistically significant ( $t = 5.12$ ).

[Insert table 5 here]

#### 5. Is the performance of firms that reorganize superior?

We are unable to repeat our operating performance analysis during Chapter 11 for firms that liquidate or are acquired. In our sample, few firms that subsequently liquidated or were acquired in Chapter 11 filed annual or quarterly financial statements after filing for Chapter 11. However, the question remains whether the performance of firms that reorganized during Chapter 11 differs from the performance of firms that are acquired or liquidated. We address this problem by computing the changes in the total market value for all our sample firms during Chapter 11 between the time they enter Chapter 11 and the time the firms emerge from Chapter 11. At filing, the eventual outcome of the bankruptcy process is still unknown (Barniv, Agarwal, and Leach, 2002) and the market value of the firm's assets should reflect the expected cost (or benefit) of the bankruptcy

<sup>12</sup> We calculate market to book as the market value of equity plus total assets minus book value of equity minus deferred taxes, all divided by book value of assets. All variables including Altman's z-score are calculated as of the fiscal year-end prior to the Chapter 11 filing.

<sup>13</sup> Following Denis and Denis (1995), we define a firm's industry as in distress if the industry median control firm experiences a decline in operating earnings over a period from one year prior to two years following the bankruptcy filing.

process. As the bankruptcy process is resolved, the information about the outcome of the process becomes publicly available. If reorganization is a better outcome, the sample of reorganized firms should exhibit higher risk-adjusted returns than the sample of acquired or liquidated firms. This section contains an empirical investigation of this issue. We find that the risk-adjusted returns on the market value of the assets of the sample of reorganized firms are not significantly different from the risk-adjusted returns on the market values of the assets of firms that were liquidated or acquired.

At the Chapter 11 filing date, we estimate the firm's market value as the actual market value of equity immediately after filing plus the actual or estimated market value of debt, warrants, and preferred. We use market values for debt when we are able to obtain prices, and we estimate the market value of each remaining debt issue in our sample at the sample average for issues of similar seniority.<sup>14</sup> We employ a similar method for valuing preferred stock. Although we were unable to obtain market prices for warrants on any of our sample firms at the Chapter 11 date, of the 89 warrant issues in our sample firms, 88 of the warrants were out of the money immediately after the Chapter 11 filing. For the single firm in which the warrants were in the money after filing, we used the intrinsic value of the warrants at filing to estimate the value. In the remaining cases, we valued the warrants at zero. (In only one case in our sample did a publicly issued warrant receive a distribution in Chapter 11.)

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<sup>14</sup> To estimate the market value of public debt, we collect bond prices for our sample firms from Moody's Bond Record and Standard and Poor's Bond Guide immediately after filing for Chapter 11. We categorize the debt as secured, senior, and junior debt and calculate average bond prices for each of the three categories just after filing for Chapter 11. On average, secured bonds sell for 75% of par (23 issues), senior unsecured bonds for 47% of par (111 issues), and junior unsecured for 30% of par (102 issues). For each of the three categories with public debt, our bond prices are similar to the recovery rates reported in Franks and Torous (1994). Franks and Torous (1994) report recovery rates of 80% for secured debt, 47% for senior debt, and 29% for junior debt. In addition, they report a recovery rate of 86% for private bank debt. We use the recovery rates for the private bank debt reported in Franks and Torous as our proxy for the market value of private bank debt and use our own estimates for the other categories of debt for which we lack market prices. Based on the statutory cap for rejected lease claims, we estimate the value of leases at 15%.

For the firms that reorganize in Chapter 11, we recompute the market value of the newly reorganized firm immediately after emergence from Chapter 11. We value all claims at market value when available. If market prices for debt are not available, we assume debt is valued at the average value for firms in our sample. (Because the sample of firms with publicly traded debt after reorganization is small, we are not able to calculate average prices for each category of debt. Overall, post-emergence debt in our sample traded at 86% of par.) Warrants without market prices are valued using the Black and Scholes model with an annual volatility of 60%. (Our results are not sensitive to the model employed for valuing warrants.)

For firms that liquidate or are acquired, we construct market values just following the Chapter 11 filing using the same process as for firms that reorganize in Chapter 11. Market values at the end of Chapter 11 are estimated as the value received for assets sold in liquidation or as the acquisition price of assets paid by the acquiring firm. For the sample of firms that are liquidated or are acquired, we are likely to understate the total value received by claimholders. In a number of cases, the firms sold "substantially all of the assets" to a single party. While we have data on the amount received for the large portion of the assets, we are not always able to obtain data on the sale of the residual assets and the resulting additional distribution to claimholders.

Finally, we estimate the monthly excess returns to our sample firms during Chapter 11. To do so, we calculate a simple return during Chapter 11 based on the beginning and ending firm market values for each firm in our sample. We do not have good estimates of each firm's asset beta, so we assume each firm in our sample has an asset beta of one. We match the dates at which our beginning and ending market values are calculated for each firm and calculate the simple return on the CRSP value-weighted index over the same period. We then subtract the CRSP return from the firm's return to obtain an excess return. Then, we calculate the monthly geometric excess

return for the firm. (In some cases, the excess return is less than  $-1$ . Instead of bounding those returns by  $-1$ , as is frequently done, we replace the geometric mean by the arithmetic mean in those cases. We tried a variety of other methods to address the problem and obtained similar results.)

We compute the average excess return for our sample firms during bankruptcy using both equal and value weights. Equally weighted excess returns are higher; in our sample, small firms tend to have higher returns. Furthermore, giving equal weight to small firms results in a skewed distribution. Therefore, we focus our discussion on the value-weighted results. (For the equally weighted sample, the mean and median excess returns for the combined acquisition and liquidation subsample do not differ significantly from the reorganization subsample.) Across the sample, the mean excess return in Chapter 11 is about 2.0% per month. The mean excess return is not statistically different from zero. The mean monthly excess return for the value-weighted sample of reorganizations is 2.0% (sample size = 48 firms); for the combined liquidation and acquisition sample, the mean monthly excess return is 2.1% (sample size = 37 firms). The mean excess returns of the two subsamples are not statistically different. This is consistent with the hypothesis that the net benefit (cost) associated with Chapter 11 for the subsample of reorganizations is equal to the net benefit (cost) for the sample of firms that were acquired or liquidated. If market participants have imperfect forecasts of the eventual outcome in Chapter 11, the similar market-adjusted returns we obtain for the subsamples for different outcomes are evidence of similar fundamental performance. Consequently, our detailed study of a sample of firms that eventually reorganize does not seem to suffer from a significant bias.

## 6. Conclusion

We examine a sample of 459 firms filing for bankruptcy under Chapter 11. Overall, our results suggest that firms, if anything, enjoy net benefits while in Chapter 11. Like Altman (1984), we find that during the four years preceding bankruptcy our sample of bankrupt firms exhibits significantly inferior performance. In contrast to Altman, we do not measure indirect bankruptcy costs during the pre-filing period when we expect that firm performance is unusually poor. Instead, we focus our tests on the operating performance of firms after the bankruptcy filing. We find an increase in the operating efficiency of the firms while in Chapter 11 as compared with the operating efficiency of firms in a matched portfolio. We adopt the Barber and Lyon (1996) methodology and show that the superior performance during Chapter 11 is not the outcome of mean reversion in EBITDA.

Data limitations force us to focus our investigation of operational efficiency on the subsample of firms that reorganize. Of the firms whose outcomes we can identify, one third are either liquidated or acquired. Net costs could differ between firms that reorganize in Chapter 11 and those that are liquidated or acquired. At the time of the Chapter 11 filing, investors do not know the outcome of Chapter 11 with certainty. We examine the risk-adjusted return of firms from the time of filing to the resolution of the bankruptcy. We find no statistical difference between the risk-adjusted returns of firms that reorganize and the risk-adjusted returns of firms that liquidate or are acquired. Therefore, the evidence suggests that our conclusions apply to all firms in Chapter 11, regardless of outcome.

We investigate the sources of gains in operating efficiency for firms that reorganize. On average, sales to assets rises by 8.3% while cost of goods sold to assets rises by only 4.2% and SG&A to assets falls by 3.3%. While these changes are statistically insignificant individually, the net effect produces a significant improvement in operating income during Chapter 11. On average,



firms reduce their assets by 21% and the number of employees by 23% during bankruptcy, but sales fall by only 14%. The gains appear to reflect improvements in operational focus.

We perform a cross-sectional regression to investigate whether improvements in operating performance can be explained by various proxies that capture hypothesized costs and benefits of Chapter 11. We find that improvements in cash flows are greater for firms with higher debt load, measured by pre-filing total debt to total assets. The automatic stay provision of Chapter 11 could be particularly beneficial for these firms. We introduce a natural measure of the bargaining complexity of a bankruptcy, the number of classes in the plan of reorganization, and find the improvements in operating cash flows are significantly negatively related to complexity. Overall, our empirical evidence is inconsistent with the hypothesis that Chapter 11 results in net indirect costs.